THE OHIO STATE UNIVERSITY

Facilities Operations and Development
Environmental Health and Safety
1314 Kinnear Road #106
Columbus, OH 43212
614-292-1284 Phone
ehs.osu.edu

Safe Operating Procedure
Analytical Radiation-Generating Equipment

Radiation-Generating Equipment Registration Information

Location Building: _____ Room: _____

1) **Radiation-Generating Equipment**

Manufacturer: _____

Model: _____

Serial Number: _____

Type of Unit: _____

Inventory Status: _____

ODH Registration Code: _____

2) **Principle Investigator**

Name: _____

Telephone: _____

Office Location: _____

Email: _____

Additional Contact Person

Name: _____

Telephone: _____

Email: _____

Radiation Emergency Cell Phone – (614) 561-7969 (24-Hour)

Office of Environmental Health and Safety – (614) 292-1284
radiation.safety@osu.edu
ehs.osu.edu

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3) **Training Log**

If using an alternative format (i.e. electronic), please insert an up-to-date copy of log here.

Name of Individual	Date of Training	Email

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Training Log Continued – Please make additional copies of this page as necessary

Name of Individual	Date of Training	Email

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4) **Authority**

Possession and use of radiation-generating devices at The Ohio State University (University) are authorized by the provisions of the Ohio Department of Health (ODH), the Ohio Administrative Code (OAC) Chapter 3701:1-68, and the Ohio State University Radiation Safety Procedures Manual for Radiation-Generating Devices (Non-Human Use).

Copies of the OAC and the Radiation Safety Procedures Manual for Radiation-Generating Devices (Non-Human Use) are available directly from Environmental Health and Safety, Radiation Safety Section, or from our web site, ehs.osu.edu.

5) **General Radiation Safety Policies and ALARA**

a) Only personnel trained and approved by the Principal Investigator may operate the device.
b) Radiation Safety must be notified of the repair, acquisition, relocation, transfer, or disposal of any unit. Radiation Safety must also be notified if an operable unit becomes inoperable or an inoperable unit is returned to service.

c) Notification should be submitted in a timely fashion via form RGD-1 "Registration for the Use/Storage of Radiation-Generating Devices," located at:

Registration for the Use/Storage of Radiation-Generating Devices

Please email the completed form to radiation.safety@osu.edu.

d) Use interlocks, barriers, or administrative controls to ensure no one can gain access to the primary beam or high scatter radiation areas. Stop the primary beam by secured shielding that cannot be readily displaced. Secure unused ports to prevent accidental exposures.
e) Secure device against unauthorized use by using a unit key control or the room lock.
f) All analytical radiation-generating equipment shall conspicuously display a clearly legible label or labels bearing the radiation symbol and the words "CAUTION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED" or appropriate words having a similar intent, near any switch or control that directly energizes the unit. Contact Radiation Safety or your Laboratory Compliance Officer for labels.
g) Open-beam configurations and all other equipment installed after February 10, 2006, shall be provided with a readily visible warning light labeled with the words "X-RAY ON" or symbols having a similar intent, and be located near the x-ray source and its controls and be illuminated when the x-ray source is energized.
h) An operating log should be maintained including the date, operator, beam voltage / current, and total exposure time.
i) All locations should have a copy of the Ohio State University Radiation Safety Procedures Manual of Radiation-Generating Devices (Non-Human Use) as well as the applicable section of the Ohio Administrative Code.

ALARA is an acronym that stands for As Low As Reasonably Achievable. It is the policy of the University to maintain radiation exposure levels not only below applicable legal levels but to also keep the radiation exposure levels as far below the applicable levels as reasonable.

ALARA means making every reasonable effort to maintain radiation exposures as far below dose limits as is practical consistent with the purpose for which the activity is undertaken, taking into

account the state of technology, the economics of improvements in relation to the benefits to the public health and safety, and other societal and socioeconomic considerations.

6) **Occupational Exposure Limits for Employees**

For occupationally exposed workers, age 18 years and over, external radiation exposure will be restricted under normal conditions to the annual limits below:

Category	ODH Dose Limit (rem per year)
Adult Worker	
Total Effective Dose Equivalent	5
Total Organ Dose Equivalent	50
Lens of Eye	15
Extremities / Skin	50
Declared Pregnant Worker (Embryo / Fetus)	
Total Effective Dose Equivalent	0.5 rem per 9 months
Minor (Less than 18 Years of Age)	
All	10% of Adult Limits

External personnel monitoring is required whenever an individual enters a controlled area and is likely to receive a dose from radiation exposure in excess of 10% of the applicable annual limit.

7) **Personnel Monitoring** (whole body or ring badges)

Required? Please check one. ☐ **Yes** ☐ **No**

If personnel monitoring is not required, go to section 8.

General Rules for Individual Monitoring Devices (whole body or ring badges)

a) Wear your individual monitoring device (dosimeter) between the waist and neck level. If one area of the body is more likely to be exposed than the rest, the dosimeter should be worn in that area.
b) The front of the dosimeter should face away from the body. Never allow clothing, buttons, pens, etc. to cover the front of the dosimeter.
c) The badge shall be worn *only by the person to whom it is issued*.
d) Dosimeters should be protected against damage from heat, moisture, and pressure.
e) Dosimeters must not be worn during non-occupational exposure, such as during medical or dental x-rays, nuclear medicine procedures, or brachytherapy procedures.
f) When not in use, badges should be stored in a protected location to prevent their damage or loss. The storage area should be away from any radiation source.
g) The RSS shall be notified whenever a dosimeter is lost or no longer needed.

8) **Policy Regarding Occupational Exposure of Minors**

Individuals under the age of 18 years are not allowed to be exposed to radiation levels in excess of 10% of the applicable adult annual limit.

9) **Radiation Safety Responsibilities:**

a) Perform an initial audit and survey of all newly installed equipment or after any modifications are made to existing equipment.
b) Perform semi-annual inspections.
c) Perform an annual survey.
d) Perform an annual inventory of all inoperable units.
e) Maintain ODH registration of all industrial analytical radiation-generating devices.

Copies of radiation surveys and inspections performed by Radiation Safety are on file at room 106 Research Center Building, 1314 Kinnear Road, Columbus, Ohio 43211.

10) **Emergency Contact Information**

The 24-hour Emergency Response Cell Phone is (614) 561-7969.

Any individuals with non-emergency questions, concerns, or inquiries pertaining to radiation safety may contact the Radiation Safety Section of Environmental Health and Safety during normal working hours at (614) 292-1284.

11) **Notification of Stolen, Lost, or Missing Devices**

The Radiation Safety Section shall be notified immediately of any radiation producing device that is stolen, lost, or missing.

12) **Notification of Overexposure**

The Radiation Safety Section shall be notified immediately of any event that may have caused, or threatens to cause an individual to receive, in a period of 24 hours,

a) A total effective dose equivalent exceeding 5 rem,
b) A lens of the eye does equivalent exceeding 15 rem, or
c) A shallow dose equivalent to the skin or extremities or a total organ dose equivalent exceeding 50 rem.

13) **Recognition of Symptoms of an Acute Localized Exposure**

Most radiation injuries are "local" injuries, frequently involving the hands. These local injuries seldom cause the classical signs and symptoms of the acute radiation syndrome. Symptoms may include a skin lesion, erythema, blistering, dry or wet desquamation, epilation, and/or ulceration. Local injuries to the skin evolve very slowly over time and symptoms may not manifest for days to weeks after exposure.

14) **Device Specific Standard Operating Procedures**

Note to recipient of this template. Please attach a description on how to operate your radiation-generating device for this section. Basic elements shall include:

a) Safety Precautions and Device Specific Safety Features (as applicable)
    a. Labeling
    b. Warning Lights – Description, Location, and Significance
    c. Interlock – Description of Operation
    d. Shutter – Description of Operation
    e. Key Control
b) Security of Device
c) Description of Additional Shielding Methods (as applicable)
d) Operating Log
e) Additional Hazards Associated with Device
f) Device Specific Operating Procedures – How Device/Equipment is Used